

REMARKS

This is a response to the non-final Office Communication of January 26, 2007. Please amend claims 1, 19, 59, 60, 61, 66, 69, 70, 73, 75 and 77 as indicated. Please cancel claim 62 without prejudice in this response. The Applicants reserve the right to reintroduce this claim in a divisional application at a later date. Upon entry of this response, claims 1-61, 63 to 66 and 68-81 are pending.

The Applicants respectfully acknowledges the Examiner's previous determination that claims 33-58, 64, 65 and 70-72 are allowed, and that claims 6, 9-18, 24 and 27-37 are allowable if rewritten in independent form. Furthermore, in the Office Action, claims 1-5, 7, 8, 19, 21-23, 25, 26, 59-63, 66, 68, 69 and 73-81 stand rejected. The Applicants respectfully request that there be reconsideration of the claims in view of the Applicant's remarks.

Allowable Subject Matter

Applicants appreciate the Examiner's indication that claims 33-58, 64, 65 and 70-72 are allowed, and that claims 6, 9-18, 24 and 27-37 are allowable if rewritten in independent form. Accordingly, Applicants have amended some allowable claims and presented remarks for the others, and respectfully asserts that they are all now in condition for allowance.

Claim Amendment Summary

Claims 1, 19, 59, 60, 73 and 75 have been amended to clarify that the electrical signal or voltage is a time-varying electrical signal or voltage, as stated in pages 12 to 14 of the description. Claim 61 has been amended to introduce the feature of claim 62 that is that the obtained measurement indicative of a first voltage one side of said test load component, and a second voltage on the other side of said load component, and current in said test load component. Claims 66, 69 and 77 have been amended to recite that the methods output a

value indicative of the identity of the device. This is implicit through the description as a whole. Claim 70 has been amended to clarify that the analogue-to-digital converter is for receiving an electrical signal and for generating a digital signal and to remove a duplicated feature (that of the processor being adapted to control the switch).

With respect to amended independent claims 1 and 59

With regard to the rejected independent claims 1 and 59, the applicants respectfully traverse the Office Action position that Slates *et al* (US2003/0222639) teaches the same system in the present invention and that it would be obvious to one of ordinary skill at the time of the invention to teach a switch arrangement connected to the measurement channel. Applicants respectively disagree and offer the following comments and declaration for consideration.

As acknowledged by the Examiner, Slates *et al* does not teach or suggest a switch arrangement connected to said measurement channel for switching the measurement channel to sequentially measure a first voltage on a first side of said load component, and one of a second voltage on a second side of said load component or a voltage difference across said load component. Applicant respectfully submits that it would not be obvious at the time the invention was made to teach such a switch arrangement by using the open/short calibration method as illustrated in figures 11 to 13 and paragraphs 135 to 138 of Slates *et al*.

The present invention, as defined by the independent claims, relates to an apparatus and method for generating an output dependant on the impedance of a device by applying a time-varying electrical signal across a series connected (known) load impedance and a device. The apparatus has a single measurement channel connected to a switch that enables the measurement channel to sequentially measure electrical signals either side of the (known) load component.

Slates *et al* concerns a digital eddy current proximity system which, like the known measuring device shown in figure 1 of the present application, uses two separate analogue to digital

(ADC) converters to take reading across the unknown load and the known load, and across the known load, respectively [see paragraph 16].

As acknowledged in the description of the present application, the switch arrangement provides an apparatus that has only one measurement channel to perform two sequential measurements of voltage either side of a load component. Since there is only one measurement channel comprising a low pass filter 29 and the analogue to digital converter 30, there is no requirement for accurate gain and phase matching of two filters and analogue digital converters. Furthermore, since all measurements are carried out using a single measurement channel, all measurements are equally affected by the characteristics of the measurement channel and thus in the calculations these factors cancel out.

It is respectfully submitted that none of the cited documents teach or suggest that such a switch arrangement is necessary, or even desirable. Even if the reader of ordinary skill were to consider modifying the apparatus of each of the cited documents in such a way, he could not do so without exercising inventive thought.

For example, the method described using figures 11 to 13 of Slates *et al* describes a calibration step of the system. The calibration step eliminates any stray impedance provided by the multi-conductor probe cable 20 and/or the extension cable 30 by performing open, short and load measurements as is known in the art. The cables are attached to the system between nodes 46 and 48 and voltage measurements V1 and V2 are taken between nodes 46, 48 and 47, 49 respectively using the open, short and known load configurations.

However, Slates *et al* does not teach measuring a first voltage on a first side of the load component and one of a second voltage on a second side of the load component or a voltage difference across the load component sequentially. The load describes in figure 14 of Slate *et al* is not the same load as required by the independent claims of the present invention. The load component according to the present invention is equivalent to item 40 in figure 1 of Slates *et al*

between nodes 44 and 46. Slates *et al* does not teach or suggest sequentially measuring first and second voltages either side of this load component as is required by the amended independent claims of the present invention.

Therefore, the applicant respectfully submits that the switch arrangement feature is not taught or suggested by Slates *et al*. Independent claims 1 and 59 are therefore non-obvious in light of the Slates *et al* document. Furthermore, dependent claims 2-18 are also non-obvious due to their dependencies on claim 1.

With respect to amended independent claims 19 and 60

The applicant respectfully submits that the amended independent claims 19 and 60 are non-obvious over the Slates *et al* document. Similar to the arguments put forward for independent claims 1 and 59, the applicant submits that the Slates *et al* document does not teach or suggest using a measurement channel to sequentially measure a first voltage on a first side of said load component, and one of a second voltage on a second side of load component or a voltage difference across said load component, as required by the claims.

The same arguments as presented above for independent claims 1 and 59 are submitted in support of independent claims 19 and 60. Independent claims 19 and 60 are therefore non-obvious in light of the Slates *et al* document. Furthermore, dependent claims 20-37 are also non-obvious in light of the Slates *et al* document, by virtue of their dependency on independent claim 19.

With respect to amended independent claim 61

With regard to the rejected independent claim 61, the applicant respectfully traverse the Office Action position that Slates *et al* teaches the same method claimed in the present invention and that it would be obvious to one of ordinary skill at the time of the invention teach using a measurement channel to sequentially measure the voltages.

The method of independent claim 61 has been amended to recite that obtaining measurements inductive of a first voltage one side of said test load component and a second voltage on the other side of said load component and current in said test component occurs. The applicants submit that this step is not the same as using an open/short calibration method to measure a first voltage and a second voltage of the proximity probe as shown in figures 11 to 13 of *Slates et al.*

The present invention as recited by independent claim 61 requires that a first voltage is taken one side of the test load component, which is a known impedance, and a second voltage on the other side of the load component, which is an unknown impedance. As stated above in the previous submissions, figures 11 to 13 show a first voltage being taken between nodes 46 and 48 and a second voltage being taken between nodes 47 and 49. The applicant submit that the voltage taken between nodes 46 and 48 is not the same voltage as required by the claims, in particular the second voltage on the other side of the load component (equivalent item 40 between nodes 44 and 46 of *Slates et al.*).

The applicant therefore respectfully submit that *Slates et al* does not measure the voltage on the “other side of the load component”, neither does *Slates et al* include the load component in the measurement of the first and second voltages.

It is therefore respectfully submitted that *Slates et al* does not teach or suggest obtaining measurements inductive of a first voltage one side of test load component and a second voltage on the other side of said load component. It would therefore not be obvious to one of ordinary skill at the time the invention was made to implement such a feature in light of the *Slates et al* document.

Independent claim 61 is therefore non-obvious in light of *Slates et al.* Furthermore, dependant claim 63 is therefore non-obvious in light of *Slates et al* due to the dependency on independent claim 61.

With respect to amended independent claims 66, 69 and 77

With regard to the rejected independent claims 66, 69 and 77 the applicants respectfully traverse the Office Action position that the claims do not appear to claim a tangible result. Independent claim 66, 69 and 77 have been amended to recite a tangible result, in particular that they output said value of said identified device.

The applicant therefore respectfully submits that independent claims 66, 69 and 77 are in an allowable condition and respectfully request favorable reconsideration.

Furthermore, dependent claim 68 and 78 to 81 are also allowable due to their dependency on independent claims 66, 69 and 77.

With respect to amended independent claims 73 and 75

With regard to the rejected independent claims 73 and 75, the applicants respectfully traverse the Office Action position that the claims are obvious in light of Slates *et al* and Macbeth *et al* (US2003/0156367A1). Applicants respectively disagree and offer the following comments and declaration for consideration.

Independent claims 73 and 75 have been amended to recite that the measurement arrangement is adapted to sequentially measure a first voltage one side of said load to component, and a second voltage on the other side of said load component or a different voltage comprising a voltage difference across said load device. As submitted in the above arguments, the applicant respectfully submits that Slates *et al* does not teach or suggest such a measurement arrangement, as the arrangement described in figures 11 to 13 do not measure a first voltage one side of said load component and a second voltage on the other side of said load component or a difference voltage comprising the voltage difference across the load component. The method describe using figures 11 to 13 of Slates *et al* measures a first and second voltage either side of the multi-conductor probe cable 20 and/or the extension cable 30. This is not the load component.

The applicants therefore respectfully submit that the Slates *et al* document does not teach or suggest the arrangement as claim in the present invention by independent claims 73 and 75.

Furthermore, the applicants respectfully submit that Macbeth *et al* does not teach such switching arrangement.

The applicant respectfully submit therefore that the invention as defined by independent claims 73 and 75 are non-obvious in light of either Slates *et al* or Macbeth *et al* whether taken alone or in combination. Furthermore, the applicant submit that dependant claims 74 and 76 are also non-obvious in light of the Slates *et al* and Macbeth *et al* documents due to their dependency on independent claims 73 and 75 respectively.

CONCLUSION

In view of all of the foregoing, the Applicants respectfully submit that claims 1-61, 63-66 and 68-81 are in condition for allowance and such action by the Examiner is earnestly solicited. If the Examiner has any questions, the Examiner is requested to contact Robert E. Stachler II at (404) 607-9991 ext 2119.

Respectfully submitted,



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